



Applying High-resolution Satellite Imagery and Remotely Sensed Data to Local Government Applications

Sioux Falls, South Dakota

Presentation Prepared by
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City of Sioux Falls GIS
November 2004



Purpose

- Analyze the usefulness of high-resolution satellite imagery applied to local government applications.
- Speculate on potential applications using the unique qualities of the satellite imagery.
- Compare high resolution satellite imagery to traditional aerial photography.
- Apply the satellite imagery to a few specific applications.



City of Sioux Falls, SD

- ⇒ Population 135,000
- ⇒ Area 60 Square Miles
- ⇒ 1,400' above sea level



Sioux Falls Employees and GIS Users

- ➡ 1000+ City Employees
- ➡ 150+ Employees with GIS software on Desktop Computers
(Primary Software (ESRI))
- ➡ Many others using GIS Internet Map Server Applications



GIS Status

- ➡ The GIS Division is a subdivision of Public Works administering all GIS Planning, Implementation, and Database configuration.
- ➡ Enterprise GIS – All data stored on centralized server and available to all City and County users.
- ➡ Data and software acquisitions, including geospatial data, satellite, airborne, and GPS data collection are managed by GIS.
- ➡ Cooperative efforts with regional government agencies.

Cooperative projects

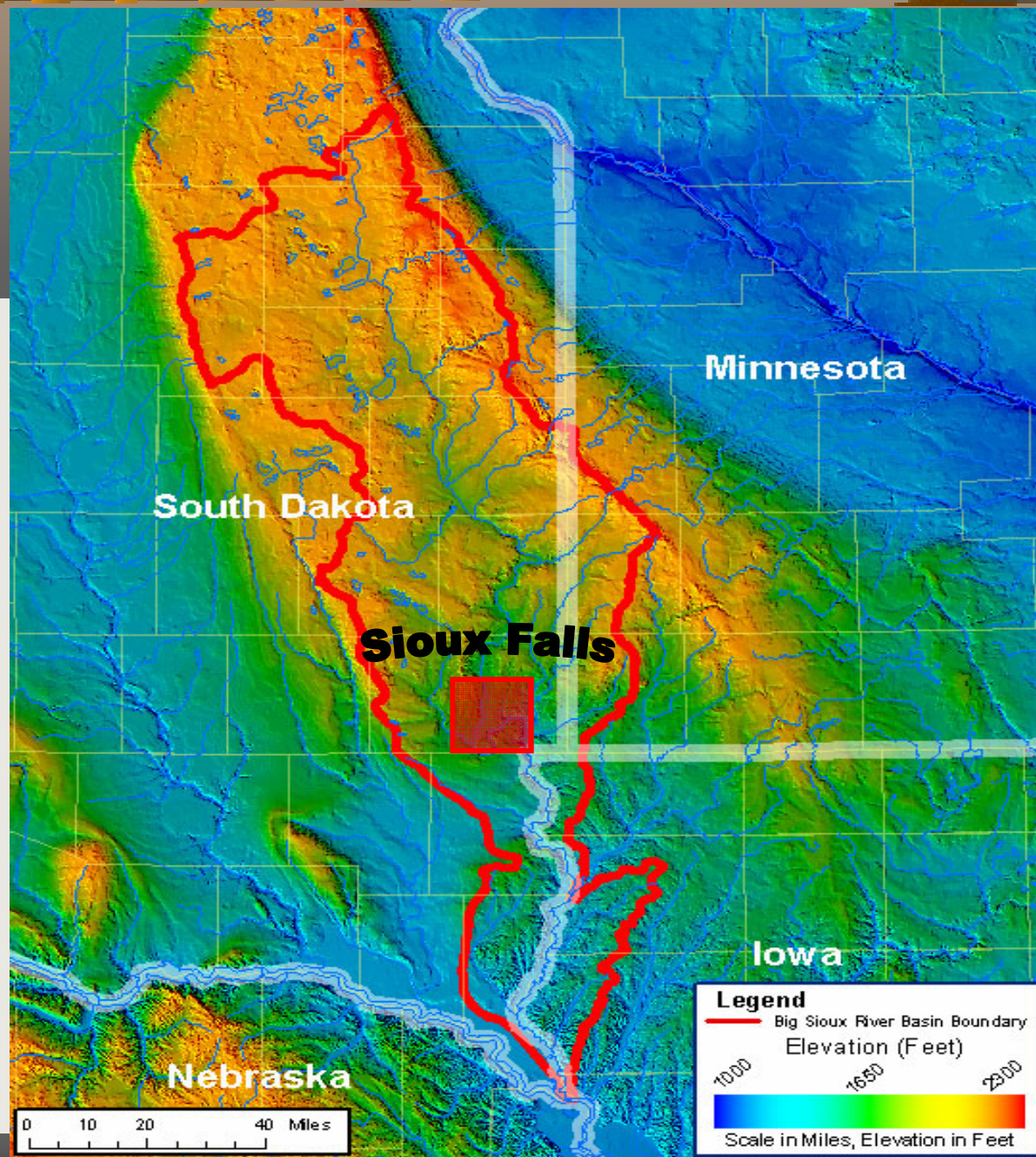
- ➔ East Dakota Water Development District
- ➔ Minnehaha County and Lincoln County
- ➔ Sioux Falls School District
- ➔ South Dakota Department of Transportation
- ➔ South Dakota State University
- ➔ Southeastern Council of Government
- ➔ University of Sioux Falls
- ➔ University of South Dakota
- ➔ United States Census Bureau
- ➔ United States Corp of Engineers
- ➔ USGS (EROS Data Center)

GIS Mission Statement

The mission of the City of Sioux Falls Geographic Information System (GIS) Office is to develop, maintain, and promote a shared GIS resource for decision makers and the citizens of Sioux Falls and the surrounding area.

The City of Sioux Falls GIS is an enterprise GIS that promotes, through spatial technologies, a more efficient and effective local government

Sioux Falls Location Map



Satellite Imagery



➤ SPACE IMAGING

- May 2002 - Multispectral 4.0 m., Panchromatic 1.0 m

➤ DIGITALGLOBE

- June 2002 - Multispectral 2.4 m., Panchromatic 0.6 m.
- April 2004 - Multispectral 2.4 m., Panchromatic 0.6 m.

➤ ORBIMAGE

- September - 2004 Panchromatic 1 m.





Aerial Photography

- ➔ HORIZONS INC.
 - May 2002 Color 0.5 ft.
- ➔ SANBORN MAPPING INC.
 - April 2004 Color 0.5 ft.

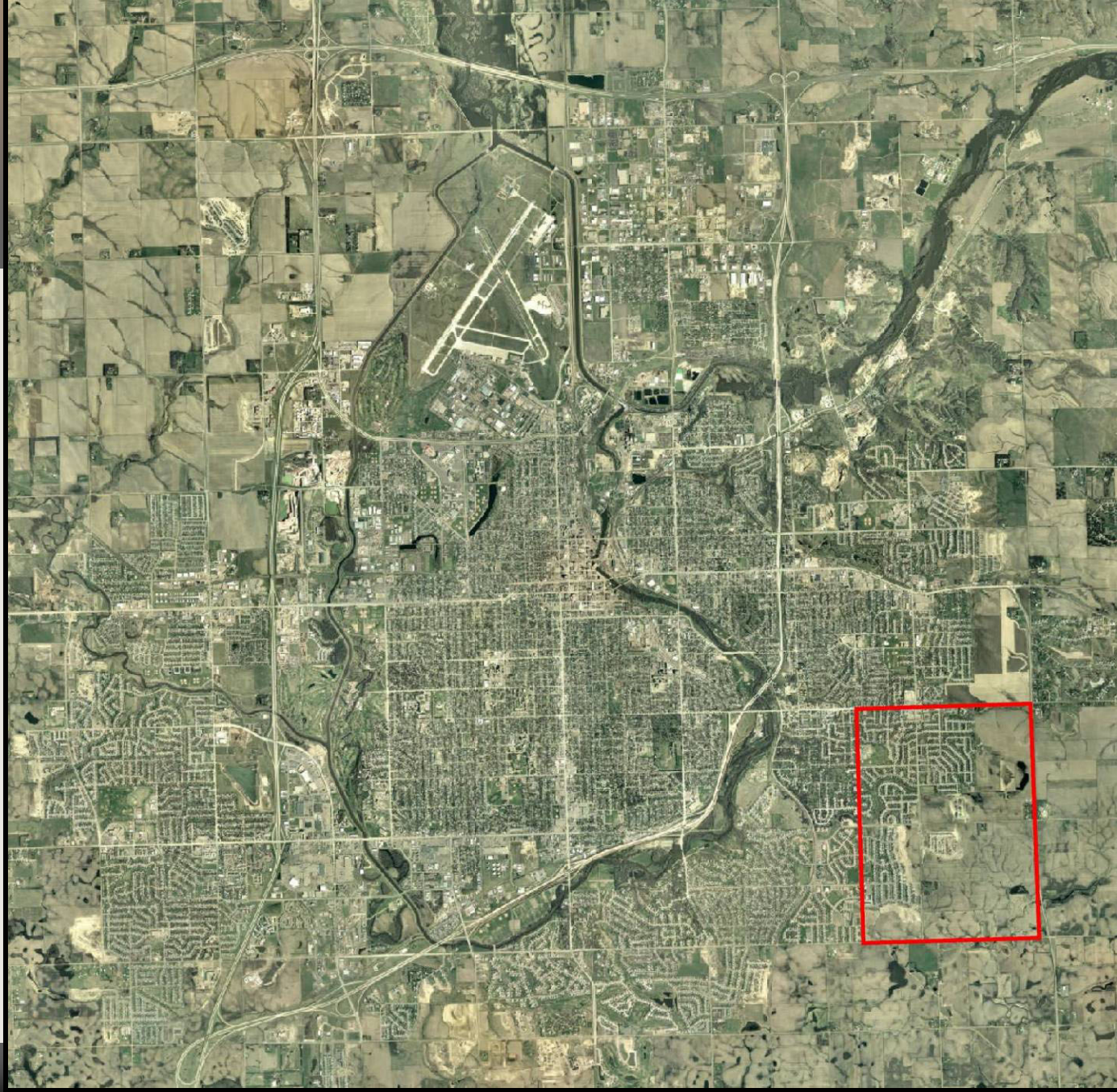


Change Detection and Feature Extraction





Target Area 1



DIGITALGLOBE

June 2002



DIGITALGLOBE

April 2004



ORBIMAGE

September 2004



DIGITALGLOBE

June 2002

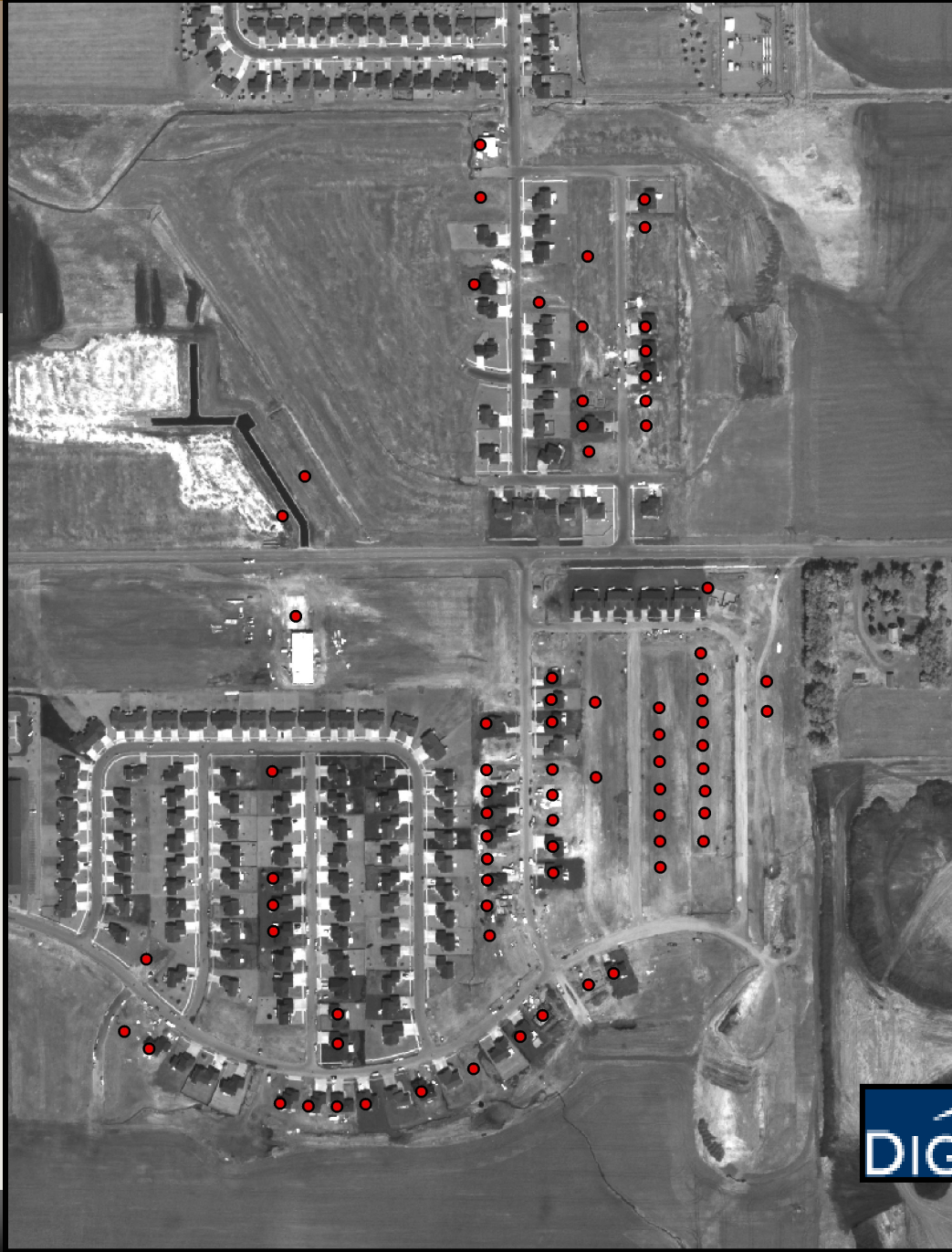




DIGITALGLOBE

June 2002

2002 Building Permit Locations



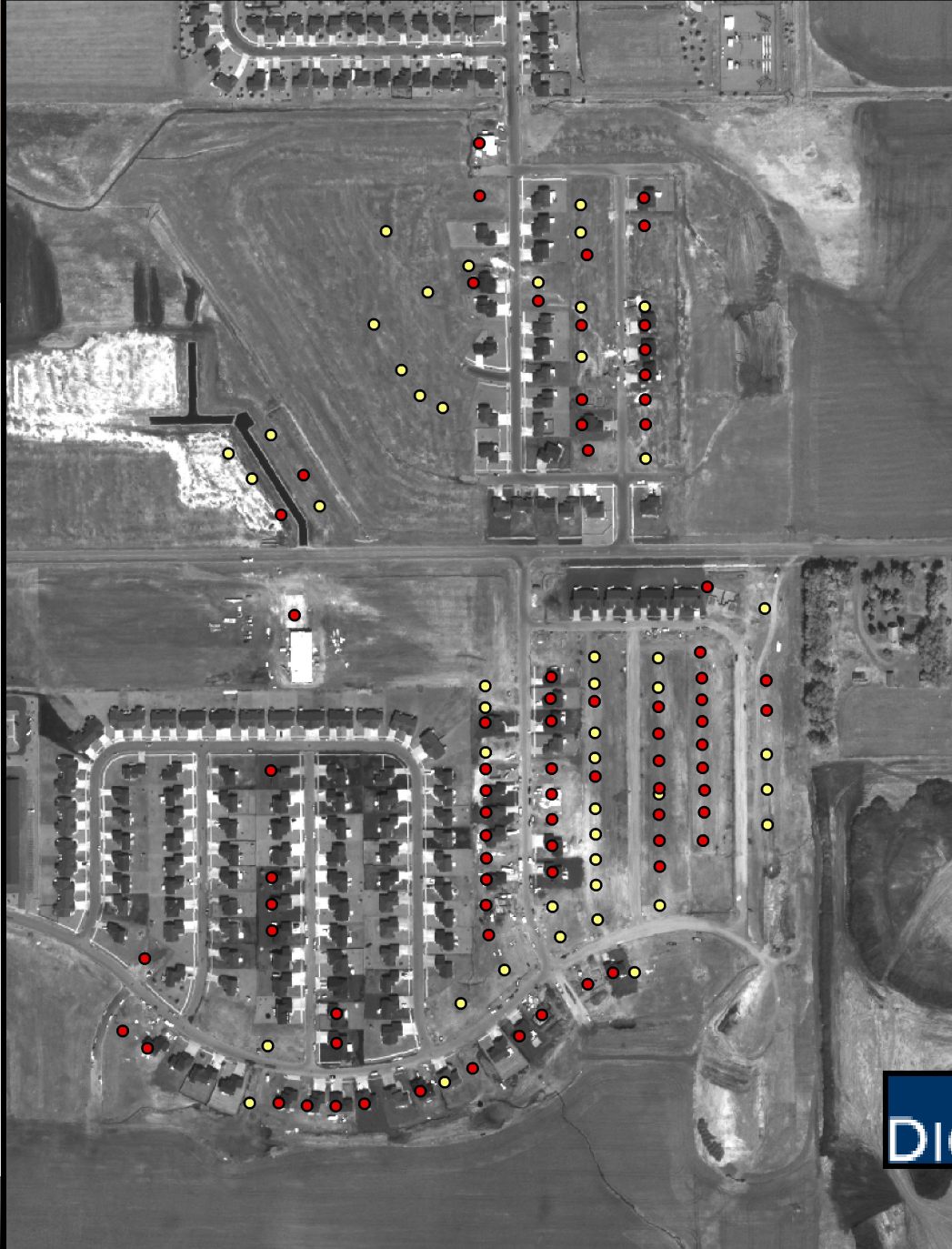


DIGITALGLOBE

September 2002

2002-2003

Building Permit Locations





ORBIMAGE

September 2004

2002-2003

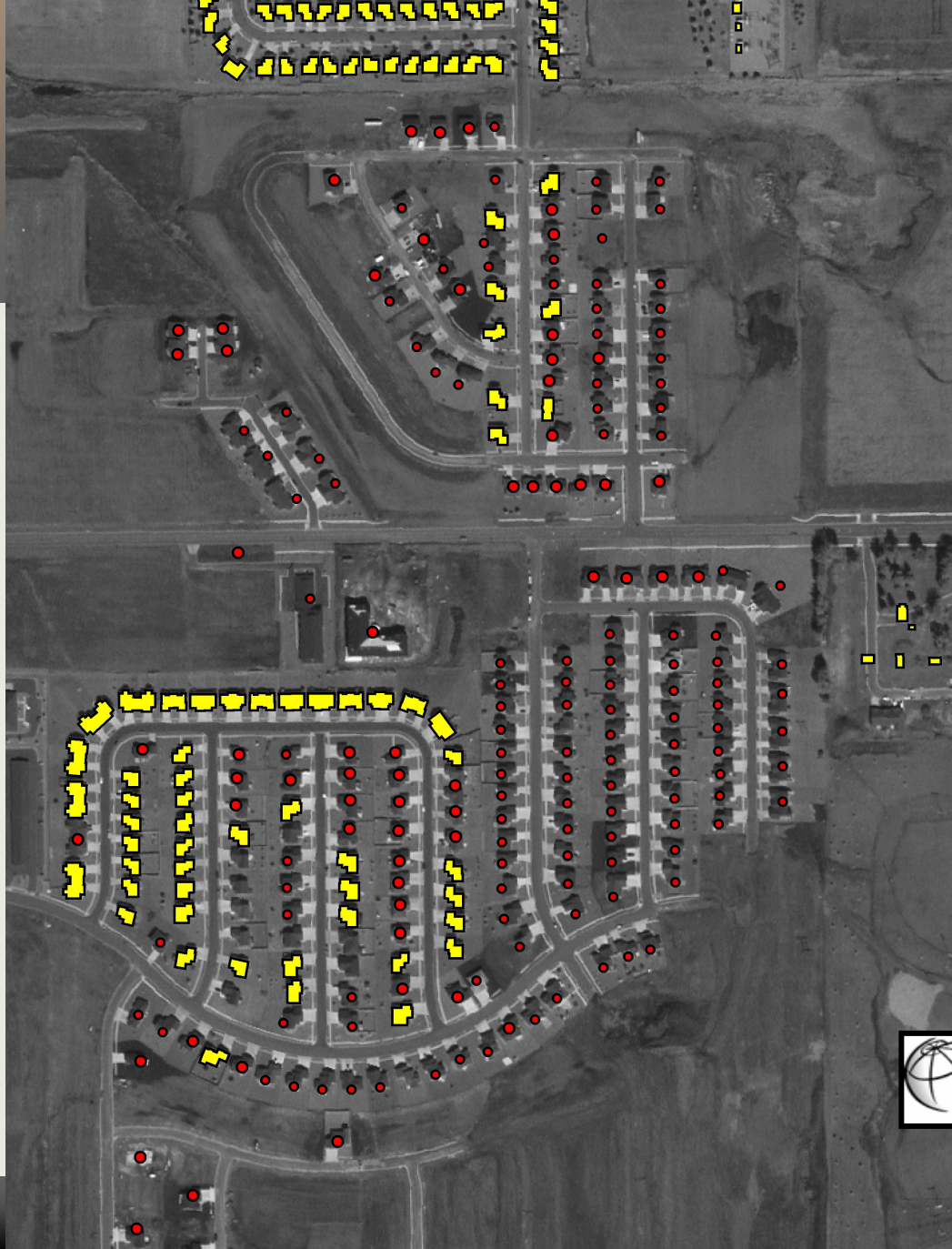
Building Permit Locations



ORBIMAGE
September 2004
Building Footprints 2001



ORBIMAGE
September 2004
Building Footprints 2001-2004



Aerial Photo April 2004



ORBVIEW October 2004



Photo Differential



DIGITALGLOBE Multispectral

June 2002



DIGITALGLOBE[®]

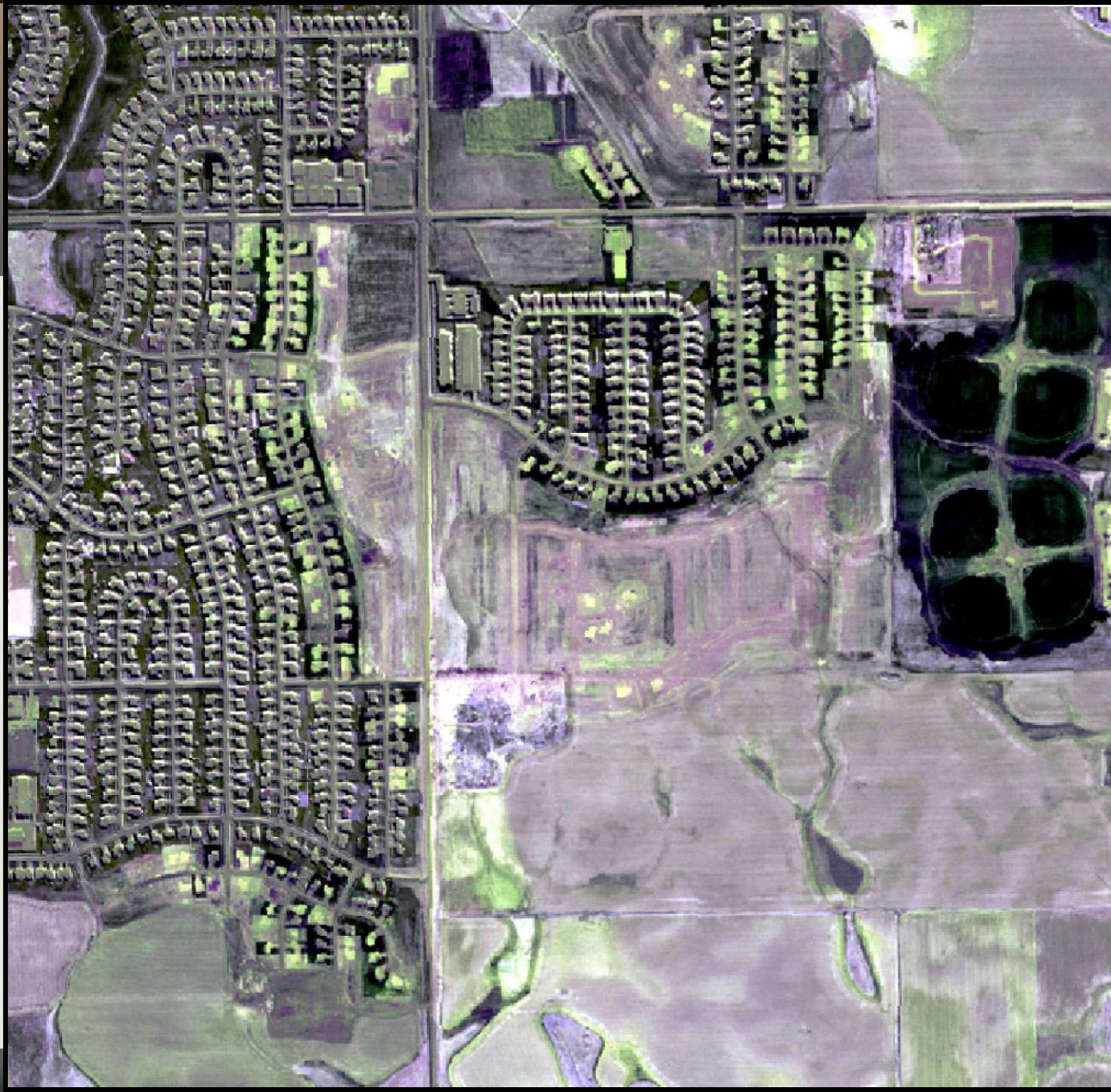
DIGITALGLOBE Multispectral

April 2004

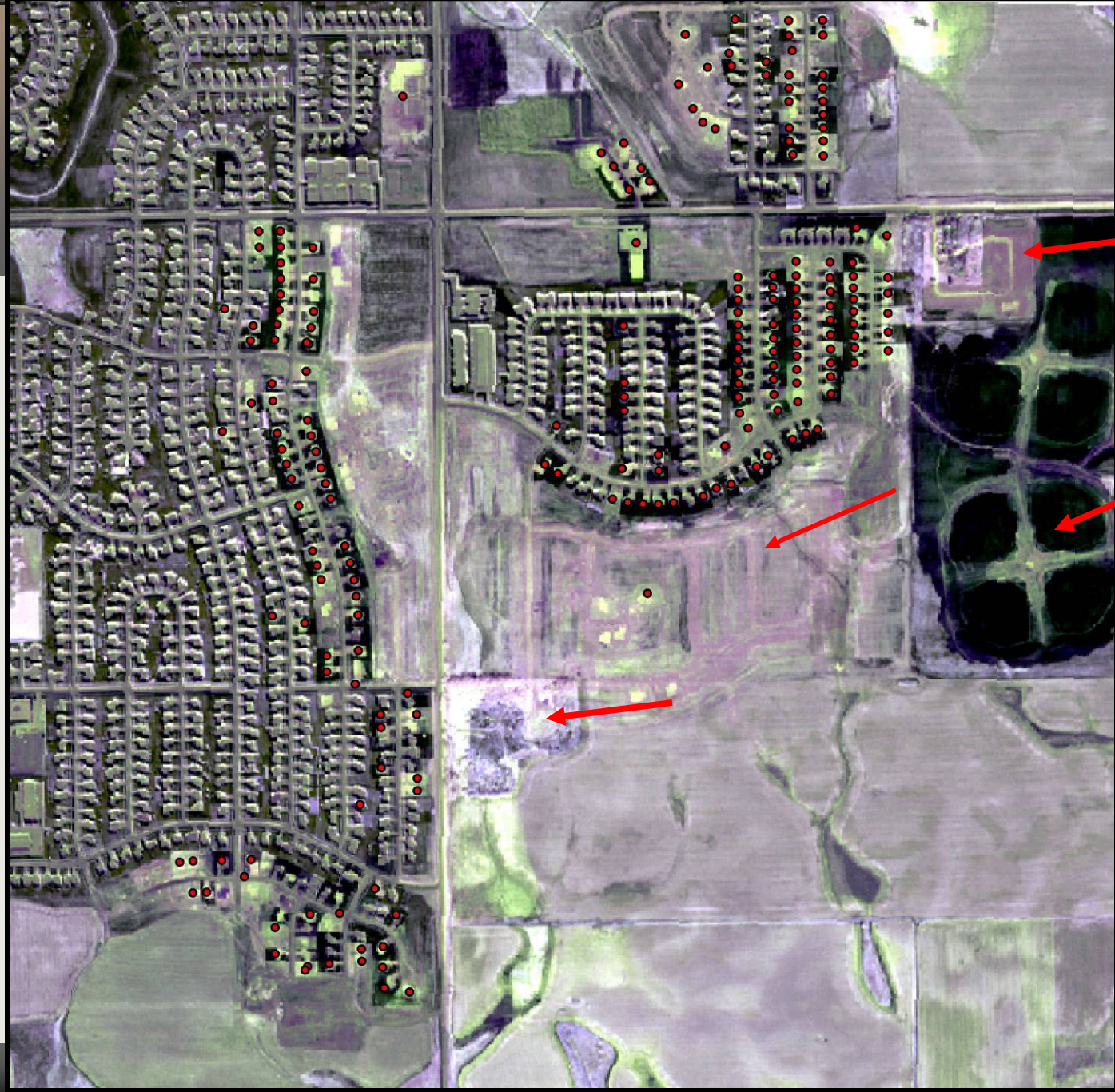


DIGITALGLOBE®

Image Differencing



Enhancing Differences





Target Area 2



DIGITALGLOBE Multispectral



2002



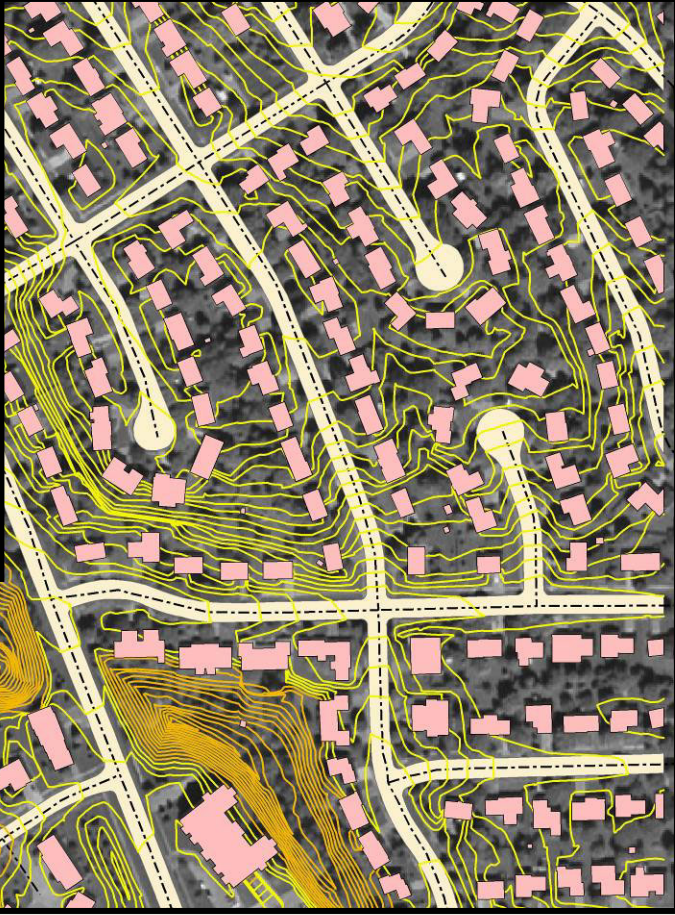
2004



Image Differencing



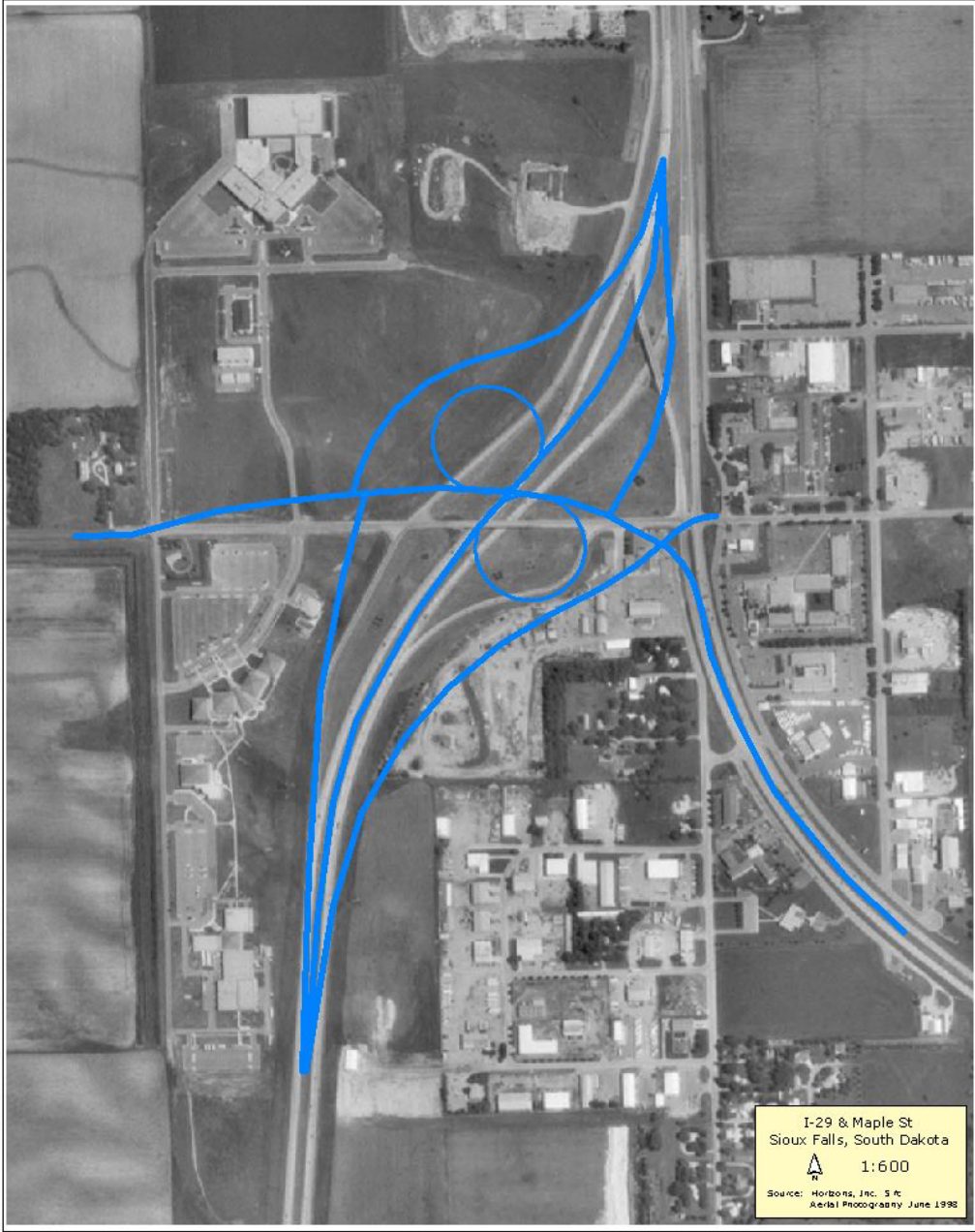
Why we do care?



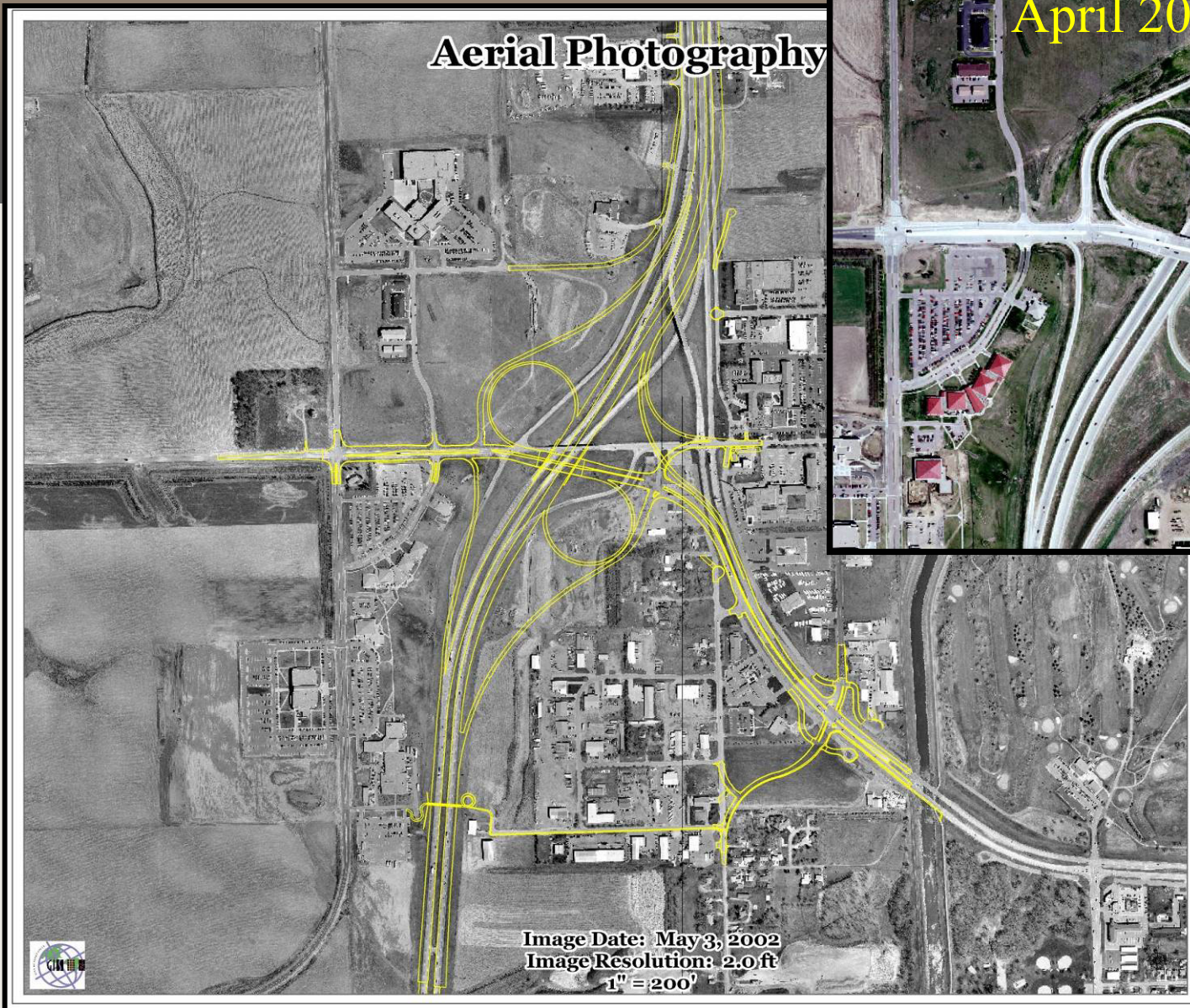
DESIGN AND CONSTRUCTION



I-29 and Maple Street Preliminary Design 1998



I-29 Maple Street Engineering – Construction

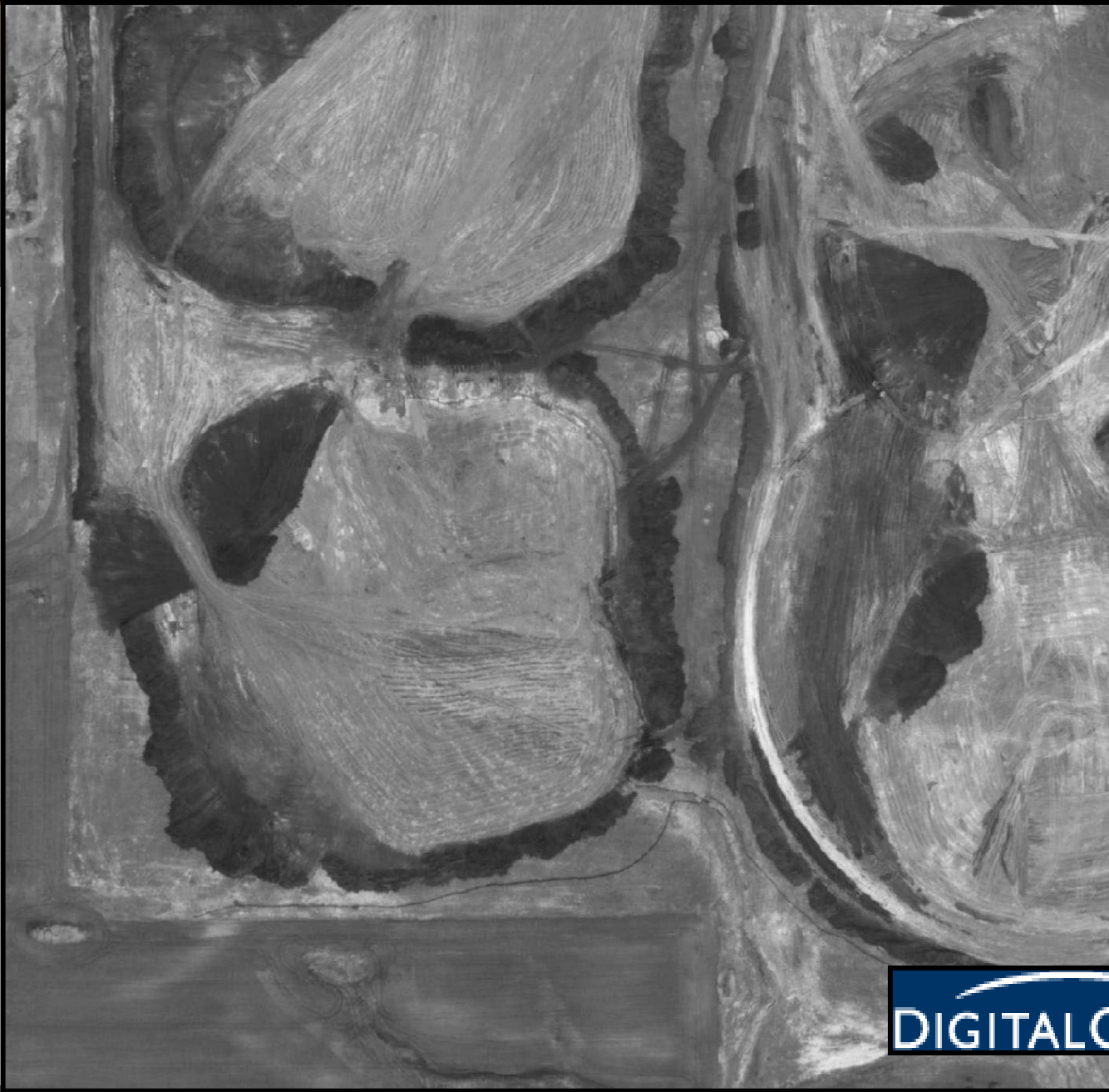




Harmon Park Design



Harmodon Park Construction Grading Begins DIGITALGLOBE 2002





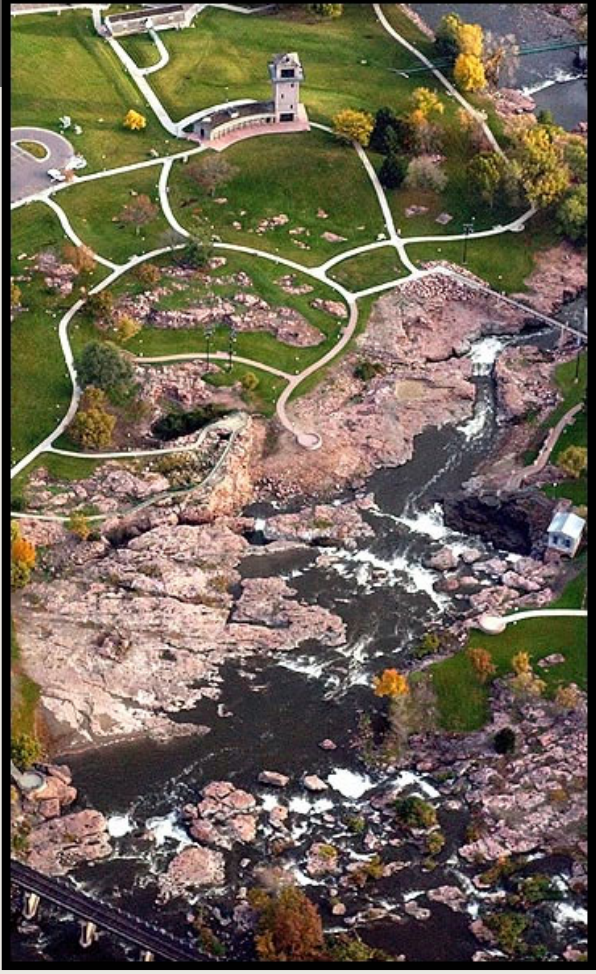
Harmon Park Construction Complete ORBIMAGE 2004



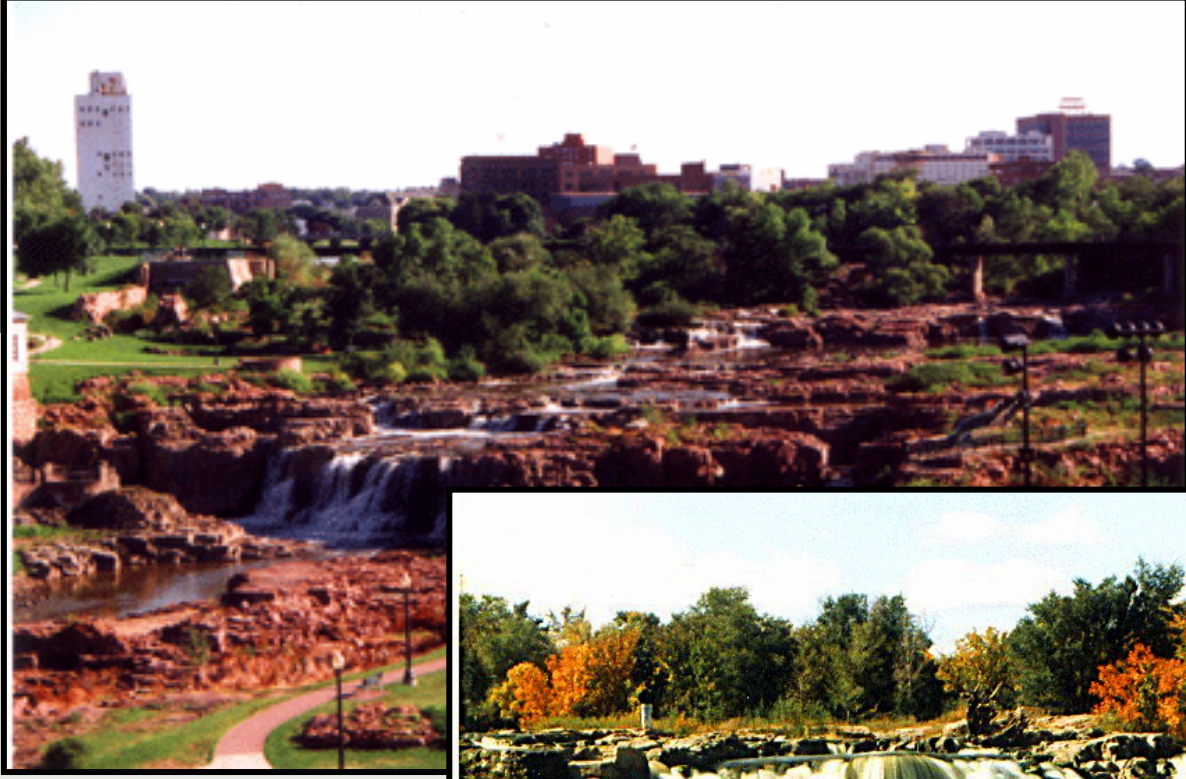
Mayor's Pet Project



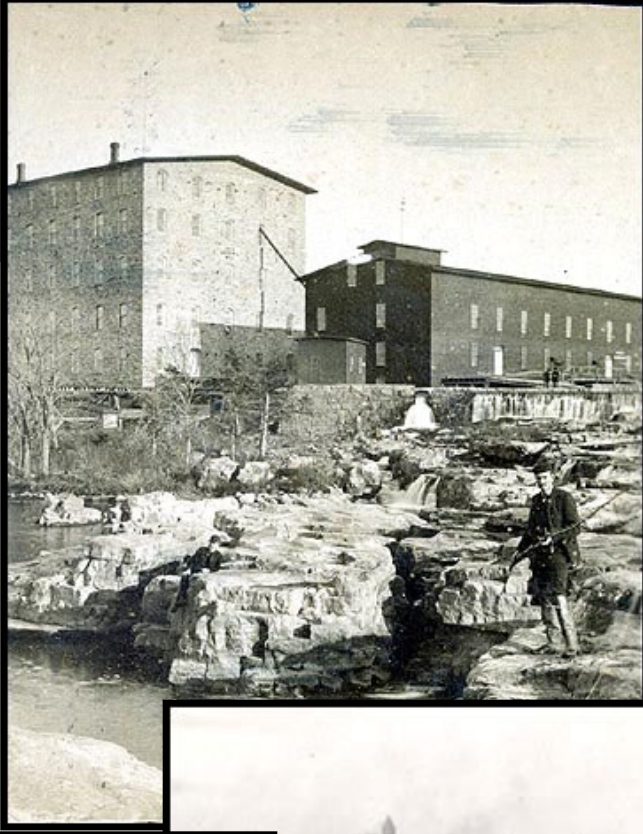
FALLS OF THE BIG SIOUX RIVER



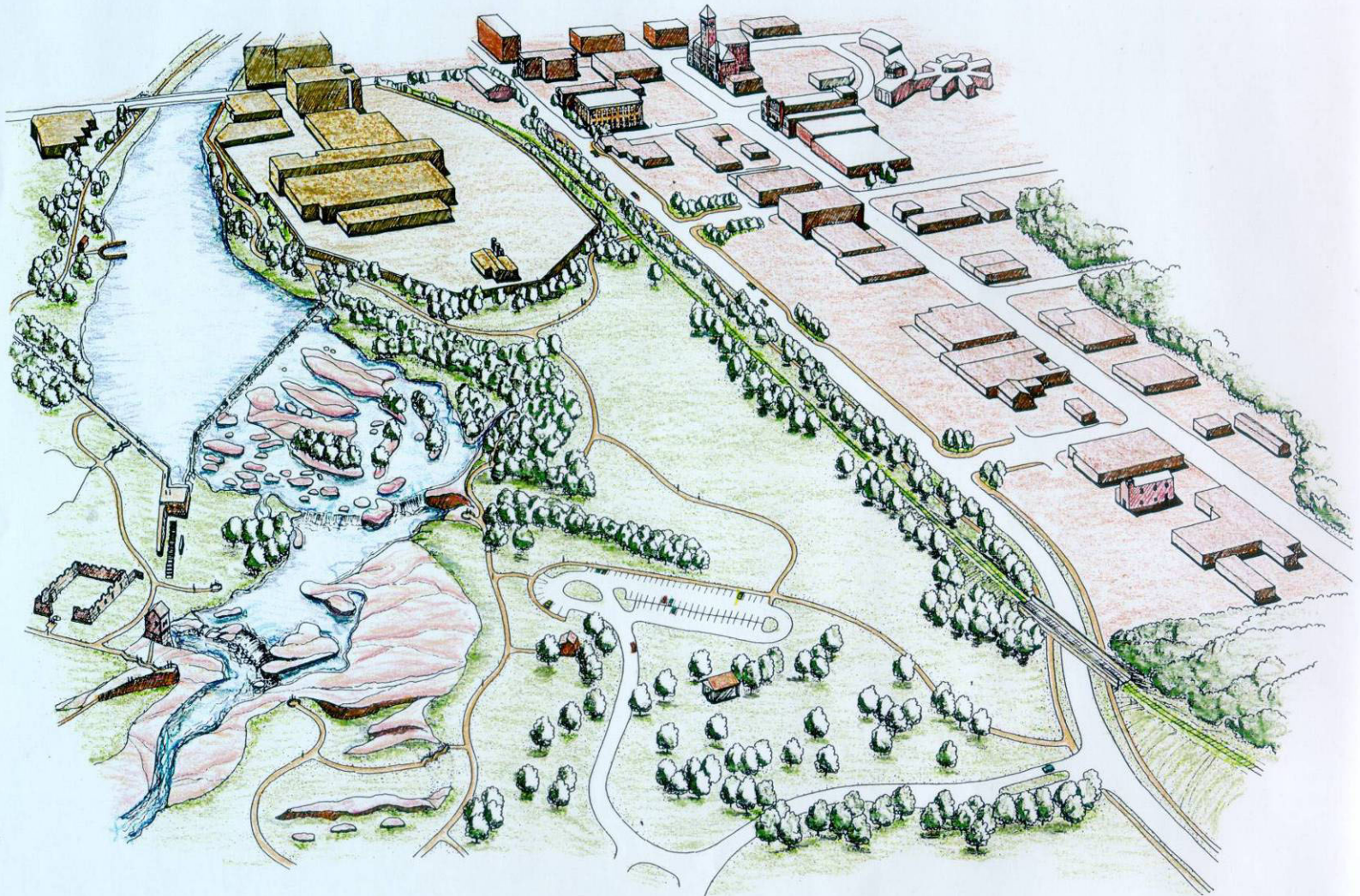
FALLS OF THE BIG SIOUX RIVER



Historical Significance



Redevelopment Plan



View Looking South

Phillips to the Falls

A Brownfields Redevelopment Plan

City of Sioux Falls

Stockwell Engineers, Inc.
Sioux Falls, South Dakota

Big Muddy
Workshop
Landscape Architecture
Sioux Falls, South Dakota
Sioux Falls, South Dakota

Phillips to the Falls May 2002



Phillips to the Falls



May 20, 2002



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Phillips to the Falls

April 2004



Phillips to the Falls September 2004



Phillips to the Falls



September 15, 2004



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May, 2002



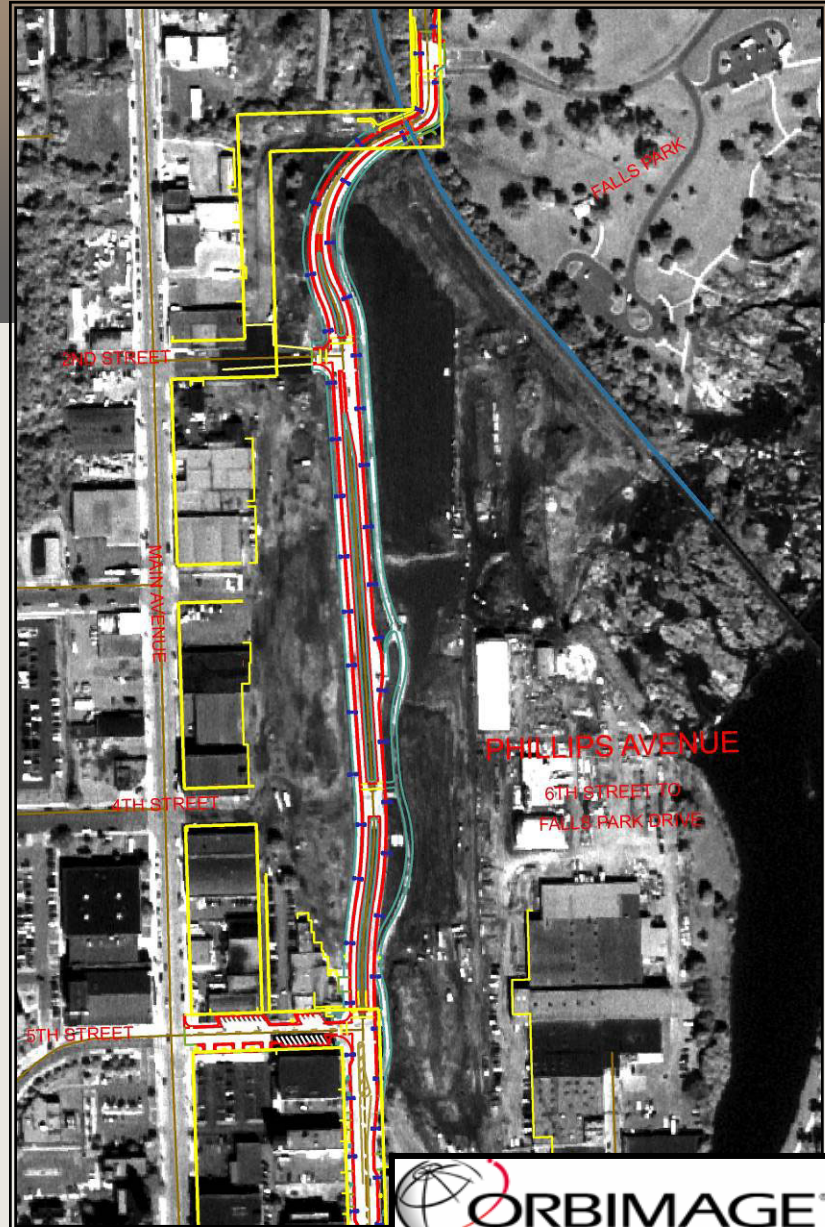
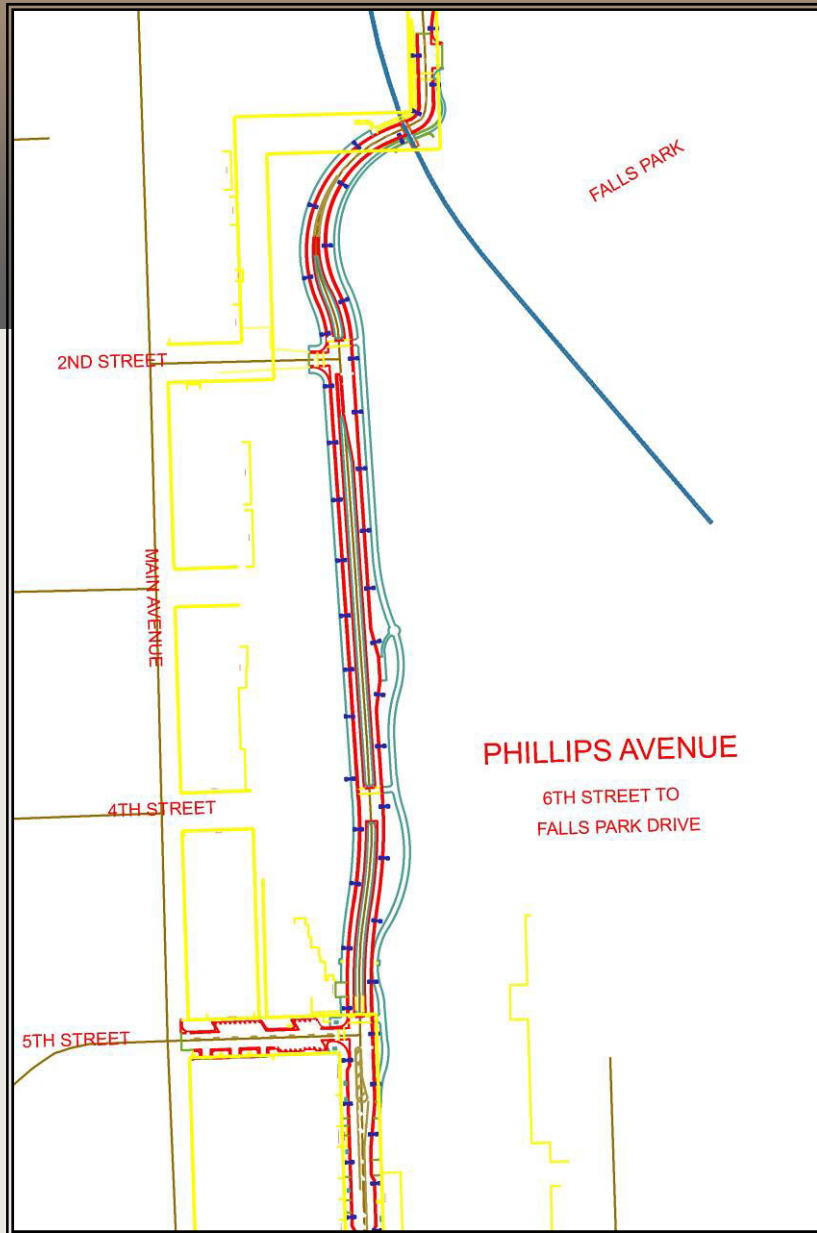
April 2004



September 2004

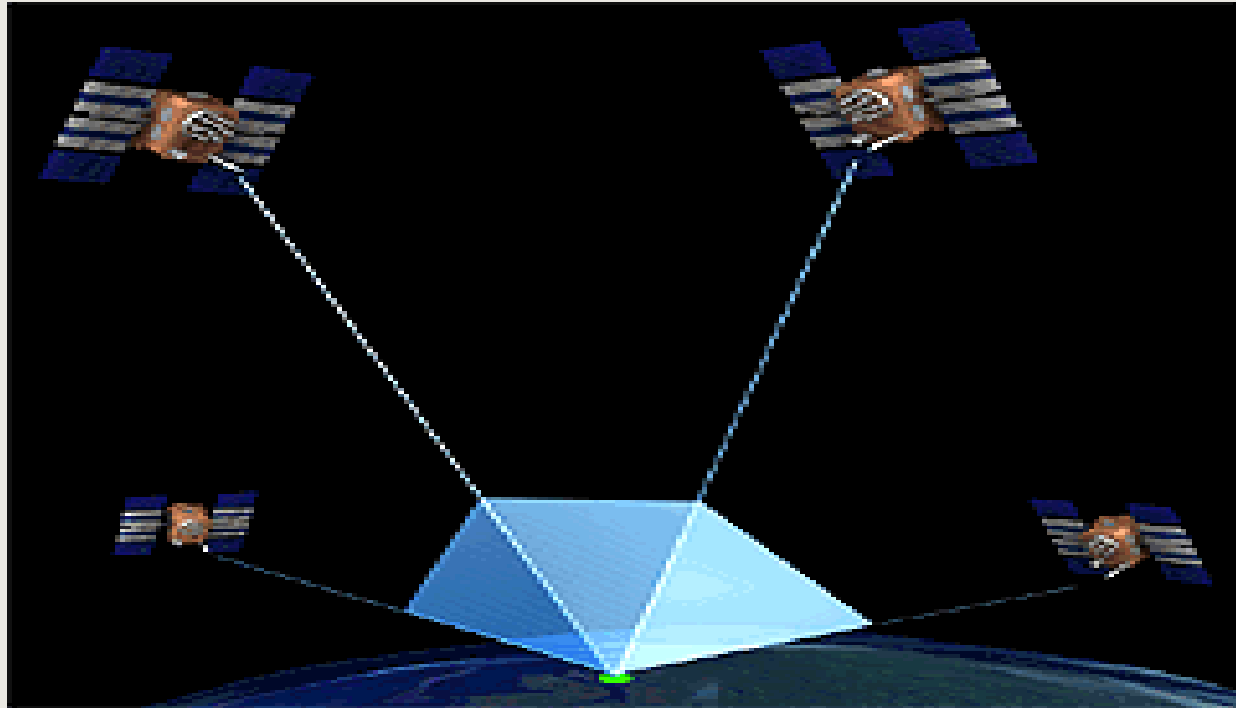


Overlaying Project Design ORBVIEW 2004 Image



Horizontal Registration

ORBVIEW 2004





ORBVIEW Image Registration





ORBVIEW Image Registration



ORBVIEW Image Registration



So what does it give us?



Examples - Local Government Applications benefiting by applying Satellite Imagery

➔ Building Services/Zoning

- Facility Mapping
- Wetland Inventories and Protection
- Zoning Compliance

➔ Emergency Response

- Pre-incident Planning
- Homeland Security

➔ Health

- Disease Mapping
- Vegetation and Wetland Mapping
 - Mosquito Control

➔ Planning

- Growth Management
- Landuse Inventory/Change

➔ Public Works/Engineering

- Facility Mapping
- Flood Control
- Project Design/Engineering
- Transportation Planning

➔ Parks and Recreation

- Facility Management
- Vegetation Management

One Final Product

